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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/564,708

01/13/2006

Christine E Krohn

2003UR020

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7590

07/19/2007

J. Paul Plummer
Exxon Mobil Upstream Research Company
P.O.Box 2189
Houston, TX 77252-2189

EXAMINER

HUGHES, SCOTT A

ART UNIT

PAPER NUMBER

3663

MAIL DATE

DELIVERY MODE

07/19/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/564,708

Applicant(s)

KROHN ET AL.

Examiner

Scott A. Hughes

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 November 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 January 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 1/13/06, 11/8/06
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeffryes (WO0161379) in view of Anderson (5410517).

With regard to claim 1, Jeffryes discloses a method of operating a plurality of N seismic vibrators simultaneously with continuous sweeps, and separating the seismic response for each vibrator (abstract). Jeffryes discloses loading each vibrator with a unique continuous sweep consisting of M (greater than or equal to) N segments, the ith segment being of the same duration for each vibrator (Page 5, Line 4 to Page 6, Line 20, Pages 7-8, 10). Jeffryes discloses activating all vibrators and using at least one detector to detect and record the combined seismic response signals from all vibrators (Page 10). Jeffryes discloses selecting and recording a signature for each vibrator indicative of the motion of that vibrator (Page 10, Line 8 to Page 11). Jeffryes discloses parsing the vibrator motion record for each vibrator into M shorter records, each shorter recording coinciding in time with a sweep segment (Page 11, Lines 1-20). Jeffryes discloses padding response signals but does not disclose padding the shorter records of the vibrator motion record to substantially extend its duration by one listening time (Pages 18-19). Anderson teaches padding seismic signals by one listening time when

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using a continuous sweep consisting of M segments. (Column 4, Lines 20 to Column 5, Line 20; Column 6, Lines 10 to 60; Column 8; Columns 12-14). It would have been obvious to modify Jeffryes to pad the signals with time up to the listening time as taught by Anderson in order to be able to process the data with a correlation reference sequence. Jeffryes discloses forming an M by N matrix whose element $S_{ij}(t)$ is the vibrator motion record as a function of time of the i th vibrator and j th sweep segment (Pages 5-7; 10-11, 14-16, 20-22). Jeffryes discloses parsing the seismic data record from above into M short records, each shorter record coinciding in time with a padded shorter record of vibrator motion from step d). Jeffryes discloses forming a vector d of length M whose element d_i is the i th shorter data recorder from the preceding step. Jeffryes discloses solving for $E_j(f)$ the system of M linear equation in N unknown $SE=D$. Jeffryes discloses inverse Fourier transforming $E_j(f)$ to yield $e_j(t)$ (Pages 10-11, 14-16, 19-20).

With regard to claim 2, Jeffryes discloses that each sweep segment is selected from linear sweep-design (Page 10, Lines 5-15).

With regard to claim 3, Jeffryes discloses that all of the N unique continuous sweeps are identical except for the phase of their segments (Page 10, Lines 15-25).

With regard to claim 4, Jeffryes discloses that all N segments are identical except for phase. Jeffryes discloses constructing a reference sweep by starting with a preselected reference segment, then advancing the segment $360/M$ degrees in phase to make the second segment, then advancing the phase $360/M$ degrees more to make the third segment, and so on to generate M segments. Jeffryes discloses constructing a

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first sweep by advancing the phase of the first segment of the reference sweep by 90 degrees. Jeffryes discloses constructing a second sweep by advancing the phase of the second segment of the reference sweep by 90 degrees and so on until all N sweeps are constructed (Page 7).

With regard to claim 4, Anderson teaches that all N segments are identical except for phase. Anderson teaches constructing a reference sweep by starting with a preselected reference segment, then advancing the segment $360/M$ degrees in phase to make the second segment, then advancing the phase $360/M$ degrees more to make the third segment, and so on to generate M segments. Anderson teaches constructing a first sweep by advancing the phase of the first segment of the reference sweep by 90 degrees. Anderson teaches constructing a second sweep by advancing the phase of the second segment of the reference sweep by 90 degrees and so on until all N sweeps are constructed (abstract; Columns 4, 6).

With regard to claim 5, Anderson teaches that each unique continuous sweep has a duration in time sufficiently long to collect all seismic data desired before relocating the vibrators (Columns 4, 6).

With regard to claim 6, Jeffryes discloses that the vibrator signature record for each vibrator is a weighted sum or ground force record of the motion of that vibrator (Page 4, Lines 5-14; Pages 10-12).

With regard to claim 7, Jeffryes discloses that $M=N$ and that the system of linear equation $SE=D$ is solved by matrix methods comprising the steps of deriving a separation and inversion filter by inverting matrix S then performing the matrix

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multiplication (Page 8, Lines 1-5; Pages 11-19).

With regard to claim 8, Jeffryes discloses that $SE=D$ is solved by matrix methods and the method of least squares comprising the steps of deriving a separation and inversion filter of the form $F=(S^*S)^{-1}S^*$ then performing the matrix multiplication FD (Page 8, Lines 1-5; Pages 11-19).

With regard to claim 9, Jeffryes discloses that each segment has a duration that is at least as long as the seismic wave travel time down to and back up from the deepest reflector of interest (Page 1).

Conclusion

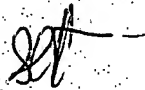
The cited prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A. Hughes whose telephone number is 571-272-6983. The examiner can normally be reached on M-F 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



SAH



JACK KEITH
SUPERVISORY PATENT EXAMINER